ABSTRACT OF THE DISCLOSURE

The invention provides a method of simulating behavior of a flow interacting with an object. The invention improves the accuracy of the approximation of the spatial p^{th} derivative D_p, $p \geq 1$, and therefore reduces the cost of the simulation. It includes

5 in the approximation values of the parameter at points which do not lay on grid lines passing through the point of computation P, and by using these values to optimize the approximation. The use of these additional points depends on a preferential direction, such as determined by the advection direction of the flow. The points used in the approximation extend beyond a unit cube on the computational grid. The simulation

10 is in three or more dimensions. The numerical simulation produces output which can be used in the design or optimization of the object which interacts with the flow. In certain cases, it is the output by itself which is important.